PANEL DISPLAY OF MULTIPLE DISPLAY UNITS FOR MULTIPLE SIGNAL SOURCES

FIELD OF THE INVENTION

The present invention relates in general to the field of displays, and more particularly to a panel display apparatus and a system of panel displays.

BACKGROUND OF THE INVENTION

Heretofore, an increasing need for flat panel display units that can be connected to each other in a mosaic-like fashion, to form a larger display area having various sizes and shapes, has been recognized by industry in such technical fields relating to computers.

The display system for the Apple Macintosh® is one attempt at solving this problem. The Macintosh® display system provides display panels that can be arranged in any desired manner to form a larger display area as long as the display panels do not overlap with each other. That is, the displays can be arranged into different configurations as long as the logical display area of the configuration does not provide redundancy between the display panels.

A configuration of such displays, however, can be utilized by only one source device (i.e. one Macintosh® computer). As a result, the Macintosh® panel display system is source device specific, and thus not useful to those having a need to interface a plurality of source devices to a display area consisting of a plurality of such Macintosh® panel displays. In addition, the Macintosh® display system is not desirable or useful to those having a need to interface different types of source devices (e.g. TV's, computers and network devices) to the same display area.

Moreover, each display panel or unit of the Macintosh® system is driven and controlled by a separate display control card placed in the expansion slots of the source device (i.e. Macintosh® computer). As a result, since each source device has a limited number of expansion slots available for such control cards, the number of displays that can be added to the display area is limited, and thus the size of the display area of the Macintosh® display system is limited.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a panel display system having the capability of interconnecting a plurality of different source devices to a plurality of display units connected in a mosaic-like manner to form a larger display area, wherein the display area can be arranged into a substantially limitless number of sizes and configurations. To attain this, the present invention provides a system having a plurality of self-contained display units, wherein each display unit has a video random access memory (VRAM) for storing image data, a controller for processing data signals to provide the image data to the VRAM, and an image display panel for displaying the image data.

In one embodiment, a plurality of self-contained display units are arranged into substantially a rectangular shaped display area, wherein each display unit has a controller, VRAM, Flash memory, a liquid crystal display (LCD), and a bus for data control and power. The display units are interconnected with each other and a plurality of source devices (e.g. TV's, computers and network devices) through data/control bus connectors. Upon power-up of the display system, each source device enters into a self-configuration mode, wherein each display unit runs the same algorithm to determine its relative position with respect to the other display units. From these coordinates, each source device can determine how to display information in the display area.

Other means for interconnecting the display panels such as cables, network devices, local area networks and wide area networks can also be used. Thus, the present invention overcomes, to a large extent, the limitations associated with the prior art.

These and other features of the invention are described in more complete detail in the following detailed description of embodiments of the invention when taken with the drawings. The scope of the invention, however, is limited only by the claims appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the present invention are described and illustrated herein with reference to the drawings in which like items are indicated by the same reference designation, wherein:

FIG. **1** is a block schematic diagram of one embodiment of a display unit utilized in the display system according to the present invention;

FIG. **2** is a side perspective view of the display unit shown in FIG. **1**;

FIG. **3** is a back view of the display unit shown in FIG. **1**;

FIG. **4** is a top perspective view of a plurality of the display units shown in FIG. **1** interconnected to form a larger display area according to the present invention;

FIG. **5** is a back view of the larger display area shown in FIG. **4**;

FIG. **6** is front view of one type of data/control bus connector for interconnecting the panel displays shown in FIG. **4**;

FIG. **7** is a back view of the data/control bus connector shown in FIG. **6**;

FIG. **8** is a front view of one type of power line connector for interconnecting the panel displays shown in FIG. **4**;

FIG. **9** is a back view of the power line connector shown in FIG. **8**;

FIG. **10** illustrates various embodiments of the display system according to the present invention;

FIG. **11** is a diagram of another embodiment of the present inventive display system showing panel displays interconnected with cables;

FIG. **12** is a diagram showing another embodiment of the invention wherein panel displays are interconnected in a network configuration;

FIG. **13** is a diagram showing the formulas used for a self-configuration process according to the present invention;

FIG. **14** is a diagram illustrating the calculation of an X coordinate for one embodiment of the present invention;

FIG. **15** is a diagram illustrating the calculation of the Y coordinate for one embodiment of the present invention; and

FIG. **16** is a diagram depicting a method of self-configuration according to the present invention using the smallest rectangle method.

DETAILED DESCRIPTION OF VARIOUS ILLUSTRATIVE EMBODIMENTS

Turning now to FIG. **1**, there is shown a block schematic diagram of one embodiment of a panel display **111** for use